



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/918,463	08/01/2001	Yongju Jung	1567.1014	2888
49455	7590	02/23/2007	EXAMINER	
STEIN, MCEWEN & BUI, LLP			DOVE, TRACY MAE	
1400 EYE STREET, NW			ART UNIT	PAPER NUMBER
SUITE 300			1745	
WASHINGTON, DC 20005				
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		02/23/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	09/918,463	JUNG ET AL.	
	Examiner	Art Unit	
	Tracy Dove	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 14 December 2006.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1,8-16,19,20,32,33 and 36-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1,8-16,19,20,32,33 and 36-41 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office Action is in response to the communication filed on 1/19/07. Applicant's arguments have been considered, but are not persuasive. Claims 1, 8-16, 19, 20, 32, 33 and 36-41 are pending.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/19/07 has been entered.

Claim Objections

Claim 1 is objected to because of the following informalities: "1,3-dioxlane" should recite "1,3-dioxolane". Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 8-16, 19, 20, 32, 33 and 36-41 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1, 19 and 33 recite "a volume ratio of the weak

Art Unit: 1745

polar solvent to the strong polar solvent to the lithium protection solvent is 3:1:1”, which is not supported by the specification as filed. Claim 12 recites “a volume ratio of the weak polar solvent to the strong polar solvent to the lithium protection solvent is 2:2:1”, which is not supported by the specification as filed. Claim 38 recites “a volume ratio of a weak polar solvent to a first strong polar solvent to a second strong polar to a lithium protection solvent is 20:16:4:10”, which is not supported by the specification as filed. Claim 39 recites “a volume ratio of a first weak polar solvent to a second weak polar solvent to a strong polar solvent to a lithium protection solvent is 16:4:20:10”, which is not supported by the specification as filed. Claim 40 recites “a volume ratio of a weak polar solvent to a first lithium protection solvent to a strong polar solvent to a lithium protection solvent is 4:1:4:1”, which is not supported by the specification as filed. Claim 41 recites “a volume ratio of a first weak polar solvent to a second weak polar solvent to a strong polar solvent to a lithium protection solvent is 2:2:1:5”, which is not supported by the specification as filed. The volume ratios disclosed in Table 1 provide support only for the specific solvent combinations described in Examples 1-7. The specific volume ratios disclosed by Table 1 cannot be broadened to describe general solvent groups. For example, Example 1 teaches a volume ratio of dimethoxyethane to sulfolane to 1,3-dioxolane of 3:1:1. Thus the specification only supports a volume ratio of 3:1:1 when dimethoxyethane/sulfolane/1,3-dioxolane are the only solvents. The claims recite open language such as “at least three different solvents” and “comprises”, which encompasses embodiments not disclosed by the Examples in Table 1. Examiner suggests “the mixed organic solvent of said electrolyte consists of three different solvents”, “the weak polar solventconsists of”, “the strong polar solvent consists of” and “the lithium protection solvent consists of”.

Art Unit: 1745

Claims 1, 8-11, 19, 20, 32, 33 and 36 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a volume ratio of dimethoxyethane to sulfolane to 1,3-dioxolane of 3:1:1, does not reasonably provide enablement for a volume ratio of a weak polar solvent to a strong polar solvent to a lithium protection solvent of 3:1:1. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims. Specific volume ratios used for a specific solvent combination in the examples may not be broadened to encompass solvent combinations not described by the specific examples. Note claim 32 requires "another solvent".

Claims 12-16 and 37 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a volume ratio of dimethoxyethane to sulfolane to 1,3-dioxolane of 2:2:1, does not reasonably provide enablement for a volume ratio of a weak polar solvent to a strong polar solvent to a lithium protection solvent of 2:2:1. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims. Specific volume ratios used for a specific solvent combination in the examples may not be broadened to encompass solvent combinations not described by the specific examples.

Claim 38 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a volume ratio of dimethoxyethane to sulfolane to dimethylsulfoxide to 1,3-dioxolane of 20:16:4:10, does not reasonably provide enablement for a volume ratio of a weak polar solvent to a first strong polar solvent to a second strong polar solvent to a lithium protection solvent of 20:16:4:10. The specification does not enable any person skilled in the art

Art Unit: 1745

to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims. Specific volume ratios used for a specific solvent combination in the examples may not be broadened to encompass solvent combinations not described by the specific examples.

Claim 39 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a volume ratio of dimethoxyethane to 2-methyltetrahydrofuran to sulfolane to 1,3-dioxolane of 16:4:20:10, does not reasonably provide enablement for a volume ratio of a first weak polar solvent to a second weak polar solvent to a strong polar solvent to a lithium protection solvent of 16:4:20:10. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims. Specific volume ratios used for a specific solvent combination in the examples may not be broadened to encompass solvent combinations not described by the specific examples. Note claim 39 should be amended to recite "2-methyltetrahydrofuran", as disclosed by Example 4.

Claim 40 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a volume ratio of dimethoxyethane to 3,5-dimethylisoxazole to sulfolane to 1,3-dioxolane of 4:1:4:1, does not reasonably provide enablement for a volume ratio of a weak polar solvent to a first lithium protection solvent to a strong polar solvent to a lithium protection solvent of 4:1:4:1. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims. Specific volume ratios used for a specific solvent

combination in the examples may not be broadened to encompass solvent combinations not described by the specific examples.

Claim 41 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a volume ratio of dimethoxyethane to diglyme to sulfolane to 1,3-dioxolane of 2:2:1:5, does not reasonably provide enablement for a volume ratio of a first weak polar solvent to a second weak polar solvent to a strong polar solvent to a lithium protection solvent of 2:2:1:5. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims. Specific volume ratios used for a specific solvent combination in the examples may not be broadened to encompass solvent combinations not described by the specific examples.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 8-16, 19, 20, 32, 33 and 36-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over, Evans et al., US 4,302,520.

Evans teaches an electrochemical cell comprising a solid cathode material, a lithium anode and an organic electrolyte. The solid cathode material includes metallic bismuth, metallic sulfur and metallic iron or lead. The electrolyte includes a mixed solvent and a solute (abstract). The cathode may include a conductive agent (2:20-21). The anode may comprise lithium or a

Art Unit: 1745

lithium alloy (2:46-55). Preferred solvents for the electrolyte include sulfolane (strong polar), acetonitrile (strong polar), tetrahydrofuran (lithium protect), methyl tetrahydrofuran (weak polar), dioxolane (lithium protect), 3-methyl-2-oxazolidone (strong polar), propylene carbonate (strong polar), butyrolatone (strong polar), ethylene glycol sulfite (strong polar), dimethylsulfite (strong polar), dimethyl sulfoxide (strong polar) and dimethyoxyethane (weak polar) (4:28-39).

Of the preferred solvents, the best include sulfolane, dimethoxyethane and 1,3-dioxolane because they appear more chemically inert to battery components and have wide liquid ranges, and especially because they permit highly efficient utilization of the cathode materials (4:34-40).

The best electrolyte solvent is a 3-methyl-2-oxazolidone (3M2O) based electrolyte. Low viscosity solvents may be used as cosolvents with the 3M2O solvent. The low viscosity solvents are listed at col. 4, lines 62-col. 5, lines 4 with dioxolane and dimethoxyethane being preferred cosolvents because of their compatibility with metal salts and their chemical inertness to cell components. Dimethylisoxazole (DMI) is a disclosed low viscosity cosolvent and is contained in Example 1. The total amount of the low viscosity cosolvent added could be between about 20% and about 80% based on total solvent volume (5:4-9). Example 1 teaches an electrolyte comprising a mixed solvent and a LiCF₃SO₃ salt. The mixed solvent comprises 40 vol% dioxolane, 30 vol% dimethyoxyethane and 30 vol% 3M2O.

Evans does not teach a specific example of the claimed mixed organic solvent having the claimed volume ratio.

However, Applicant's own disclosure teaches that 3-methyl-2-oxazolidone may be used as the strong solvent. The claims have been amended to delete "3-methyl-2-oxazolidone" (3M2O) merely to try to overcome the prior art of record. No support is found in the

Art Unit: 1745

specification for the deletion of 3M2O. Applicant's invention does not disclose any rational for the deletion of 3M2O or why 3M2O could not function as the strong polar solvent. Furthermore, the courts have ruled that by the presentation of a Markush group for the strong polar solvents, Applicant has made the representation that for the purpose of the present invention, the elements of the group are equivalents. Having made this representation, Applicant may not now argue that these two elements are not equivalents. *In re Skoll*, 187 USPQ 481 (CCPA 1975). Thus, the invention would have been obvious to one of skill because 3M2O is considered equivalent to the strong polar solvent sulfolane recited by the claimed invention.

Note Evans teaches at least seven of the members of the strong polar solvent Markush group as disclosed by the present invention. Also disclosed by Evans are at least two members of the weak polar solvent Markush group and at least two members of the lithium protection solvent Markush group as disclosed by the present invention. Furthermore, the courts have ruled where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Swain et al.*, 33 CCPA 1250, 156 F.2d 239, 70 USPQ 412. The courts have held that a limitation merely with respect to proportions in a composition of matter or process will not support patentability unless such limitation is "critical". *Minerals Separation, Ltd. v. Hyde*, 242 U.S. 261 (1916).

*

Claims 1, 8-16, 19, 20, 32, 33, 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vourlis, US 5,432,030.

Vourlis teaches a lithium/FeS₂ rechargeable electrochemical cell comprising an electrolyte including a solvent mixture of 3-methyl-2-oxazolidone (strong polar), 1,3-dioxolane

Art Unit: 1745

(lithium protect) and 1,2-dimethoxyethane (weak polar) with a LiCF₃SO₃ salt. See abstract.

FeS₂ is a sulfur based compound comprising an iron additive. The anode may contain lithium or a lithium alloy (3:42-45). The cathode may contain a conductive material and a binder (Ex. 1).

The cathode material is coated on a current collector (Ex. 4). The cathode may contain In₂S₃,

Pb₃O₄ or TiS₂ (1:47-50). Sample D in Table 1 teaches a volume ratio of 3:1:1 of dimethoxyethane to 3M2O to 1,3-dioxolane (weak polar to strong polar to lithium protection).

Example 2 in Table 2 teaches an electrolyte with 23.3% 1,3-dioxolane/46.7%

dimethoxyethane/30% 3M2O. See claim 1.

Vourlis does not explicitly teach the strong polar solvent sulfolane in the claimed volume ratio of the mixed organic solvent.

However, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because Applicant's own disclosure teaches that 3-methyl-2-oxazolidone may be used as the strong solvent. The claims have been amended to delete "3-methyl-2-oxazolidone" (3M2O) merely to overcome the prior art of record. No support is found in the specification for the deletion of 3M2O. Applicant's invention does not disclose any rational for the deletion of 3M2O or why 3M2O could not function as the strong polar solvent. Furthermore, the courts have ruled that by the presentation of a Markush group for the strong polar solvents, Applicant has made the representation that for the purpose of the present invention, the elements of the group are equivalents. Having made this representation, Applicant may not now argue that these two elements are not equivalents. In re Skoll, 187 USPQ 481 (CCPA 1975). Thus, the invention would have been obvious because 3M2O is considered equivalent to the strong polar solvent sulfolane recited by the claimed invention.

Art Unit: 1745

Furthermore, the courts have ruled where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Swain et al., 33 CCPA 1250, 156 F.2d 239, 70 USPQ 412. The courts have held that a limitation merely with respect to proportions in a composition of matter or process will not support patentability unless such limitation is “critical”. Minerals Separation, Ltd. v. Hyde, 242 U.S. 261 (1916).

Response to Arguments

Applicant's arguments filed 12/14/06 have been fully considered but they are not persuasive.

Applicant argues Evans fails to teach or suggest the volume ratios of the weak polar solvent to the strong polar solvent to the lithium protection solvent of the claimed invention. However, the courts have held that a limitation merely with respect to proportions in a composition of matter or process will not support patentability unless such limitation is “critical”. Applicant has not provided evidence of unexpected results that distinguishes the claimed invention over Evans.

Applicant argues Vourlis fails to teach or suggest a volume ratio of the weak polar solvent to the strong polar solvent to the lithium protection solvent is 3:1:1. However, Sample D in Table 1 teaches a volume ratio of 3:1:1 of dimethoxyethane to 3M2O to 1,3-dioxolane (weak polar to strong polar to lithium protection). Applicant has not addressed the motivation statement provided to support the Examiner’s obvious in view of Vourlis position.

Note all volume ratio limitations of the claimed invention are rejected under 35 U.S.C. 112, 1st, as not being supported by the specification as filed.

Art Unit: 1745

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

February 20, 2007



TRACY DOVE
PRIMARY EXAMINER